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Navigating climate's human geographies: exploring the whereabouts of climate politics

1. Introduction

The ubiquity of climate change appears difficult to escape. In the quarter of a century since the 1992 UN Rio Conference on Environment and Development brought the issue firmly on to the international political agenda, climate's politics have become a familiar saga of hope and unhappy endings, of incremental progress against an ever more urgent call for action. At the mundane level climate change is also pervasive. From the promises of low carbon milk with breakfast cereal to news stories of smart green buildings and emerging landscapes of renewable energy technologies on the horizon, climate change and its signifiers scatter our daily lives. Indeed, climate change's ubiquitous presence in sites as diverse as local solar-powered swimming pools to the boardrooms of large multinationals, the celebrity Instagram posts of Leonardo de Caprio, lives lived under conditions of inundation, changing patterns of food availability and the mediated presence of the annual circus of international climate negotiations has hardly gone unnoticed within the discipline of human geography. Across the discipline there are research groups, conference streams, and special issues of journals, while climate change now features on geography curricula from primary schools to Masters programmes. With its history of engaging with the environmental challenges facing society, climate change has presented a significant opportunity to the discipline not only to show its relevance but also to reassert its interdisciplinary capacity. Geography's long-standing self-identification as a space in which different forms of knowledge can come together has received renewed impetus from a global environmental research agenda which has placed significant emphasis on the importance of the production of integrated knowledge. This in turn has meant that climate change is predominantly framed as an issue to be found in the 'middle' of the discipline (Castree 2015; see also Liverman 1999).

Yet despite its obvious presence climate change can appear strangely absent within human geography. Despite growing recognition since the wave of new environmentalism in the 1960s that matters of the environment were also acutely political, economic, social and cultural and despite the ways in which geographers have been part of the turn to undo the nature-society dualism (Castree 2014; Mansfield and Doyle 2017), 'the tendency to label some issues as "environmental" and others as "economic", "cultural" or whatever ... dies hard' (Castree 2002: 358). Consequently, as Karen O'Brien argues, when it comes to climate change 'human geographers have failed to shift the focus of the scientific discourse away from "the environment" as the problem and towards an integrated understanding of [societal] change' (O'Brien 2012: 593-4). The positioning

of climate change in the middle of the discipline and as part of human geography's historical interest with issues of environmental hazard and its claims to interdisciplinarity, coupled with the overarching frame of global change research as a science-led concern, means that ““without concerted effort and struggle” the opportunity presented by growing societal concern with climate change “is likely to be used in a ‘safe’ and rather predictable way by only a sub-set of human-environment geographers” which may in turn serve to may serve to “narrow humanity’s future options and aspirations” when it comes to addressing this challenge (Castree 2015: 1-2). Climate change occupies then a highly ambivalent position within human geography, both celebrated as a means through which the discipline can gain credence and as an object around which new forms of integrated knowledge can be produced, whilst at the same time being a far from central concern for most of the discipline.

My purpose in this article is to explore the whereabouts of climate change¹ within the discipline and consider the consequences and implications of its ambivalent position. The first part of the paper considers how the ways in which climate change has come to be positioned within the social sciences has shaped what are, and are not, regarded as the human geographies of climate change. As one of the two social science disciplines who have shown the most appetite for engaging with climate change (the other being economics, see Hackman and Lera St Clair 2013), the intention here is not to use human geography to approximate for the social sciences as a whole but instead to consider what the curious absence of climate change from much of the discipline might suggest about the growing intensity of calls from the (scientifically driven) global environmental change research agenda for more, and more integrated, social science knowledge. I suggest that the ambivalence of climate change within the discipline serves to perpetuate a conception of climate-as-problem that elicits particular kinds of knowledge and response, which in turn shapes how climate change comes to be recognised and addressed outside of the academy (Hulme 2008). If we are to escape the inevitable positioning of social science as a mechanistic response to scientifically defined (global) problems and solutions (O’Brien 2012), we need to revisit both our imaginaries and our practices of climate change human geographies and how they come to constitute the agenda for what are deemed ““necessary and feasible actions’ in a post-Holocene world” (Castree 2015: 2).

To this end, the second part of the paper turns to examine the growing field of what are termed ‘critical climate studies’ and what this might offer in terms of an alternative agenda (Bulkeley et al. 2015; Strippel and Bulkeley 2014). Whilst others have either dismissed calls for a critical social science of climate change – the agenda being so urgent, and requiring specific forms of constructive intervention from the social sciences – or have

¹ With apologies to John Allen for borrowing and intentionally corrupting the title phrase of his article (Allen 2004).

suggested that such perspectives will be purposively excluded from the global change research agenda (Castree 2015), the purpose here is to explore how they might open up new possibilities for human geography and the social sciences more broadly within a repurposed agenda for global environmental change research. If climate change is treated as a problem-object, and one primarily determined by biophysical processes, the social science agenda can readily be framed as how various social entities – actors, institutions, policies – respond. Yet if we take the perspective that such a priori divisions between the social and natural are themselves subject to question, attention necessarily shifts to the ways in which climate change comes to be made and configured in relation to all manner of other socio-material entities, flows and moments. This in turn means that there is no clear cut division between what is, and is not, a *response* to climate change. For some, this is quite disorientating – the path to follow, the solutions to implement are no longer clear cut. Yet the intention is not to deny the differential carbon consequences of alternative socio-technical systems or practices. Rather, it is to suggest that the task is not to understand how particular silver bullets can be implemented or policy levers can be pulled, but rather to open up the spaces of possibility for action and to generate new capacities for doing so.

Focusing particularly on the matter of governing climate change, I draw on two vignettes of cases of climate politics that require that we start from seeing climate *as a condition* (Bulkeley 2016). Such a relational perspective places the politics of climate change – and the role of social science - not in singular responses to a discrete problem, but in the ways in which climate change comes to be rendered more or less amenable to diverse forms of intervention, ethics and forms of resistance. Conceiving of climate-as-condition opens up the possibilities of what are ‘necessary and feasible actions’ through which responses can take place. It expands its political possibilities. At the same time, it raises the provocation of how the boundaries of climate change might be delimited, to determine its entanglements and consider its ir(relevance) to the matter at hand, whether that be of urban regeneration, collective identities, or the working of the global economy, and what this in turn means for the whereabouts of climate change within human geography. This perspective suggests that climate change can no longer be left in the ‘middle’ of the discipline and that calls for integrative knowledge production need to be replaced with those that seek different kinds of interdisciplinarity that might be based on different terms of engagement and practices of knowledge production.

2. Climate Change Social Science

“human geography risks falling into the ‘inevitability’ trap, accepting both the problem and the solutions as given, leaving little room for alternative thinking and focusing instead on the practicalities”

O’Brien 2012: 588

Calls for the social sciences to engage in global environmental change research have grown ever more pressing over the past decade. If during the 1990s climate change was considered primarily of scientific concern, with the formation of the Intergovernmental Panel on Climate Change (IPCC) focusing primarily on increasing scientific knowledge (Hulme 2008), the expansion and growing breadth of the IPCC has been driven in part by a growing inclusion of social science. At the same time, research programmes formed in the 1990s to generate international collaboration in particular scientific or social science domains have been brought together under the Future Earth initiative. Established in 2010 by the International Council for Scientific Understanding, the International Social Science Council and the major funders group the Belmont Forum, Future Earth has been built on, and served to entrench, the notion that climate change needs to be understood from a holistic, integrated perspective (Lövbrand et al. 2015; Castree et al. 2014). Underlying Future Earth, and other research programmes that seek to champion interdisciplinarity, is what we might term an integrative impulse – that the key task of interdisciplinary work is to provide an integrated perspective, and in particular to cross the boundary or close the gap between science-based understanding and that derived from the social sciences.

At the same time, the particular role for the social sciences is usually regarded as one of providing the knowledge required to enable society to address this ‘grand challenge’. Since inception of the global environmental change agenda, the social sciences have been seen as a ‘translator’, providing the means through which effective forms of communication can be created that entice individuals to ‘do their bit’ for the global environment (Hinchliffe 1996; Hulme 2008; Owens 2000; Petts et al. 2008). More recently, as the IPCC faces increasing calls for relevance and the need to provide ‘policy solutions’, social science is also regarded as essential in identifying possible solutions and being at hand to overcome the barriers to their implementation. The combined impetus for integrated research and the positioning of social sciences as providing the conduit for scientific findings to take effect within society has led to a situation in which: “scholars across political science, human geography, sociology and economics are today asked to align with global environmental change research agendas and hereby participate more fully in the strong and immediate commitment ‘to actions that reduce the known risks to Earth’s life support system’” (Lövbrand 2015: 215).

It is the prevalence of this narrative for both integrated and actionable social science that leads Karen O’Brien to warn of the ‘inevitability trap’ facing the unsuspecting human geographer – that with the role of social science so clearly demarcated and the challenge of climate change so urgent, the task for human geography, along with the rest of the social sciences, is to focus on how to be useful. Others caution differently – that it is imperative that human geographers must take advantage of these new opportunities or risk being regarded

as irrelevant in the face of some of society's greatest challenges. Yet in the midst of these opposing views what is perhaps most striking is the relative absence of climate change from human geography, whether advanced through the narrow framing provided by the global environmental change community or overtly constructed as in some sense alternative. These concerns – of the framing of the kinds of social science deemed necessary and desirable on the one hand and the absence of sustained engagement by social science on the other – are related in complex ways. To explore this, the remainder of this section turns first to review how social science has been positioned within the latest wave of calls for a renewed, integrated approach to understanding matters of global environmental change. It then turns to the task of tracing the emergence of climate change within human geography, to consider the extent to which it has been able to avoid the 'inevitability trap' and what its presence within the discipline might tell us about the consequences of the renewed sense that climate change requires the social sciences.

2.1 The Burning Necessity of Social Science

While the impetus for integrated, interdisciplinary research on the global environment have periodically arisen over the past thirty years (Hulme 2008) , the scope and scale of the latest wave have been especially significant and has been particularly focused on (re)positioning the role of the social sciences in this agenda:

“In this renewed push for inter-disciplinary global change research, the focus has fallen sharply on the social sciences, with natural scientists, sponsors and funders alike calling for more social science, better social science and, very importantly, for more attention to global changes challenges from mainstream social science disciplines. For the most part, these calls are driven by the simple recognition that if the fundamental causes and consequences of global change are social, then so must the solutions be. With the effects of human actions on global conditions seemingly snowballing, and the time we have for finding effective, sustainable solutions apparently running out, social science knowledge has become necessary knowledge; its full integration with the natural sciences no longer a choice but a burning necessity.” (Hackman and Lera St Clair 2013, p. 9)

As this report from the International Social Sciences Council (ISSC) makes clear, and Castree (2015: 4-5) has argued, for the most part the renewed attention being given to the social sciences is intended to create forms of knowledge which are able to make “global change research more relevant to ‘mitigation’ and ‘adaptation’ policies” (Castree 2015, 4-5). This quest for a new integrated social sciences of global environmental change

has been accompanied by the development of institutions, such as Future Earth, the IPBES and reoriented IPCC within which space is increasingly being created for the social sciences. These developments have been motivated by a concern to “bridge the gap between science and policy, increase knowledge availability, and facilitate its translation into effective action” (Turnhout et al. 2014: 584).

From this perspective, the social sciences are proving particularly problematic. Now convinced of the importance of integrating the social sciences in the global environmental change agenda, research programmes are finding that there is limited appetite amongst social science disciplines to engage. Analysis conducted by the ISSC finds that relatively few disciplines have engaged in any sustained manner with global environmental change. Where this has taken place, it is argued, it is because of the ability of disciplines – the two most notable being economics and human geography – to be bought ‘seamlessly into these domains’ of scientific research. In other words, social science has been successful to the degree that they are (seen to be) compliant with the integrative approach to interdisciplinarity. For the report’s authors, the important finding is that the “more traditional, mainstream disciplines – political science, sociology, anthropology and psychology – lag significantly behind” in their engagement with global environmental change research (Hackman and Lera St Clair 2013). While not explicitly articulated, the lack of engagement from ‘mainstream’ social science is implicitly regarded as a problem because of the legitimacy this confers on certain kinds of knowledge (in this case, related to global environmental change) within and beyond these disciplines as well as because it suggests that there is a vast pool of relevant knowledge that has to date not come to be directed towards a significant societal challenge. To address these issues the ISSC suggests a more explicit engagement with a series of ‘cornerstones’ of social scientific enquiry that have a high degree of relevance for global environmental change research, including the historical and contextual complexities that drive global change, the full range of consequences for societies, the ways in which individuals and institutions engage in subjective sense-making and forms of governance and decision-making. Flagged as a “charter for the social sciences, a common understanding of what it is that the social sciences must and can do” in order to realise the integrated, transformative global change science, the ISSC effectively diagnoses the challenge as one of signalling to mainstream social sciences that their concerns are of relevance to global change research (and vice versa) and of seeking to foster more integration.

Yet delving beneath the surface of the ways in which social science disciplines have engaged with global environmental research reveals a more complex picture. Taking the field of political science, a recent survey by Green and Hale (2017a) of scholars of international relations (IR) finds that while most “IR scholars in the United States see climate change, along with conflict in the Middle East, to be the greatest global threat in the

years to come just 7% of them describe their primary or even secondary research field as environmental politics ... (and) fewer than 2% of the articles published in the top disciplinary journals (defined by impact factor) are on environmental subjects.” While their argument is that the marginalisation of climate change is considerably less than other environmental issues, nonetheless the analysis points to a stark lack of engagement with the politics of climate change and where it does take place a particularly narrow framing of the climate issue – a result which left the authors feeling ‘shocked’ about the state of global environmental research in their discipline (Green and Hale 2017b).

Seeking to account for this state of affairs, they find two plausible explanations: there are few graduate programmes on environmental political science within international relations, and the bias in highly cited journals which serves to exclude female authors tends to also work to marginalise environmental politics as there are more women working in that subfield. Such an analysis begins to yield more insight as to the underlying issues that shape the absence of what the ISSC term mainstream social science within the global environmental change arena. From this perspective, even where social sciences may be addressing pertinent topics (as identified by the ISSC) the environment remains marginalised through disciplinary structures and cultures. Thus even if global environmental research communities would open up the possibilities of engaging with the underlying “social and cultural norms, practices and power relations that drive environmental problems in the first place” (Lövbrand et al. 2015: 212) the extent to which the social science that engages with such dynamics is concerned with environmental matters appears moot. As Green and Hale incisively demonstrate, this is not due to a lack of concern for global environmental issues (and hence at least some degree of individual motivation to be engaged in this field), but rather because of the ways in which at least some disciplines may be structured such that questions of the environment are systematically marginalised.

Climate Change’s Human Geographies

These findings raise interesting parallel questions for the whereabouts of climate change in human geography. Famously undisciplined about its boundaries, determining what is and is not human geography is a far from exact or fruitful pursuit. Nonetheless, as one of the social science disciplines identified by the ISSC as most involved with climate change research understanding how, where and with what implications these forms of engagement are emerging has consequences not only within the discipline but more broadly for the social sciences. Bluntly put, if human geography has been at the forefront of the social science response to climate change to date, we might expect the discipline to be central to any renewed calls for more social science to be engaged in the global environmental change agenda and, perhaps, to be in the vanguard of developing

alternatives that can move beyond the 'inevitability trap'. While human geography does not in any sense stand in for the social sciences, its experience in finding space for climate change can be seen to have potential consequences beyond its boundaries. For the authors of the ISSC report, human geography's past success in addressing climate change is down to its capacity to be integrated with scientific research, reflecting the disciplines history (and external image) of occupying the middle ground between environment and society. However, as with the case of political science above, the story is more complex, and more intriguing. Rather than being a central preoccupation across human geography's wide range of sub-fields, positioning climate change as occupying the 'middle' of the discipline leads it to be primarily a concern of those who (self) identify as 'environment and society' scholars. This reflects the ways in which climate change entered the discipline during the '90s and has, arguably, been perpetuated by the continuation of disciplinary structures, agendas and practices that assume a distinction can readily be drawn between that which is natural and that which is social, despite the emergence of radical critiques of such a philosophy within the discipline.

While there has been no definitive history of the emergence of climate change research within human geography, it is possible to gather a partial picture of its whereabouts from the series of commentaries that have been written reflecting on disciplinary engagement with the issue (Hulme 2008; Liverman 1999; O'Brien 2010, 2012) as well as by tracing its presence in core disciplinary journals. Initiated by a series of articles in *Progress in Human Geography*, geographers started to explore the importance of climate change in relation to a variety of topics, and gathered momentum through research supported by The Global Environmental Change programme (UK ESRC 1991 – 2001). As climate change entered the arena of human geography it did so largely through long-standing concerns for geographies of hazard/risk, particularly as they related to questions of development, as well as through geographies of environmental policy and planning that had developed through the 1980s. In relation to questions of hazard, risk and development geography, concerns for global environmental change were coupled to an already rich seem of work on (predominantly rural) vulnerability and its causes, broadly influenced by the notion of political ecology and a concern for the ways in which (global) production systems created forms of social, economic and environmental vulnerability (Liverman 1999). Throughout the 1990s this body of work sought to engage with the emerging issue of climate change to consider how climate impacts might reshape forms of vulnerability and the possibilities for resilience and adaptation, and geographers (including for example Bob Kates, Billie L. Turner, Tom Wilbanks, Diana Liverman, Tom Downing, Neil Adger, Karen O'Brien) have been at the forefront of this area of research and central to the work of international research assessments including the IPCC, International Human Dimensions Programme and Future Earth.

In terms of work in human geography on questions of environmental policy and planning, research on climate change during the 1990s could largely be located in two main strands. First, work on the science-policy interface, including how expert knowledge is produced, the relation between knowledge and power, public responses to environmental risk and alternative forms of public knowledge. Taking some inspiration from sociology and the publication in 1992 of *Risk Society* by Ulrich Beck, as well as Brian Wynne's important work on the nature of uncertainty, researchers including Steve Rayner, Gordon Walker, Sally Eden, Susan Owens, and Karen Bickerstaff examined the ways in which climate change was being established and mediated as an environmental risk. Second, research which examined the ways in which individuals both responded to and were positioned in relation to climate change. On the one hand, this has involved geographical research on the factors that shape individual attitudes and behaviours and the ways in which these explain the willingness or otherwise to take up pro-environmental behaviour, for example research conducted by Stewart Barr and colleagues. On the other hand, geographers have long taken a critical stance to policy approaches and political campaigns that position the individual as obligated to the global environment. Landmark papers in this area by Jacqui Burgess and Caroline Harrison, Gail Davies, Steve Hinchliffe, James Blake, Anna Davies, Rachel Slocum and Kersty Hobson established the ways in which the positioning of individual responsibilities more often than not entailed a shift of obligations away from those who might have the power and capacity to act and towards those who felt alienated and disconnected from the global environment as a category of either action or meaning.

In addition, climate change came to be attached to a third area of disciplinary concern - questions of geopolitics and security (Dalby 2013). Since early interventions by Simon Dalby, work on climate's geopolitics has found its way into the pages of *Transactions*, the *Annals* and *Progress*, along with key articles in *Political Geography* during the early 2000s by Jon Barnett & Neil Adger, Rafael Reuveny, and Philippe le Bilion which are amongst those most frequently downloaded from that journal. Yet despite the strong engagement from political geographers with questions of climate change, other questions that occupy that area of the discipline – related to, for example, the nature of the state, identity, borders, citizenship and so on - have, with some exceptions (O'Riordan and Jäger 1996), only more recently come to be considered in relation to climate change. Hence, through the 1990s and early 2000s when climate change was becoming established as a topic of research it was primarily located within existing spheres of 'environment and society' research, rather than across the wide remit of human geography concerns (with the notable exception of some aspects of political geography). Placing climate change in the 'middle' of the discipline was made possible by, and served to reify, an ongoing distinction between nature (traditionally regarded as the domain of natural science) and society (the proper concern of human geography) and to further embed the notion that such forms of research should be, in some way, integrative – that is, they should span this gap and, optimally, serve to stitch it together.

Rather than being produced solely through those institutions and research funds concerned with creating a global environmental change agenda, it appears that the structure and practices of geography as a discipline have also played a part in shaping the narrative that climate change social science is of a particular kind.

Growing Presence and Persistent Absence

From these initial starting points, the extent and variety of geographic engagement with climate change has grown significantly, with topics including carbon markets, climate-induced migration, cities and climate change, alternative economies, climate and development, climate finance, corporate social responsibility, carbon sequestration, and many more now well versed across human geography. Yet for all its expansion, the position of climate change within the discipline retains a curious absent-presence: there is no doubt that climate change is firmly part of domains of inquiry with which human geography is concerned, yet the confluence of how climate change's whereabouts in the discipline was initiated together with the global landscape for climate change research has meant that the issue has only a precarious toehold within the discipline. In considering this ambivalence, of both a growing presence and a persistent absence, two sets of dynamics seem particularly important.

First, despite the growing variety of climate-related topics addressed, its reach remains limited beyond those areas of the discipline that are regarded as being occupied by avowed 'environment and society' scholars of one kind or another (Castree 2014). No systematic survey of the type conducted for International Relations by Green and Hale (2017b) has yet been conducted, but an overview suggests that the prevalence of climate change within geography journals in other sub-fields remains limited. For example, there have only been 26 articles in the *Journal of Economic Geography* where the term "climate change" appears in the abstract or the title, the first of which was published in 2002 and 20 of which have appeared since 2010. This suggests at least a growing engagement with the topic over the past decade. For sure, human geographers have been prolific in contributing to the growing debates concerning climate change in specialist environmental journals (for example in *Global Environmental Change*, *Global Environmental Politics*, *Local Environment* and so forth). Yet this reinforces the sense that climate change is something to be dealt with as an *environmental* problem, first and foremost, rather than, for example, as a matter of power, the global economy, identity or inequality. Indeed, the separation of the environment as a particular domain has recently become further institutionalised as publishing houses seek to create distinct spaces for this kind of research. Notably, *Nature* has launched a series of journals focused on *Climate*, *Energy*, and most recently *Sustainability*, whilst a journal that historically provided a space within the social sciences to bring environmental concerns together with

those of politics and governance, *Environment and Planning C*, has been reoriented to focus on 'politics and space' whilst a new separate journal, *Environment and Planning E* now provides a demarcated space for environmental research. The result of both disciplinary concerns and publishing practices is that climate change's human geographies are often to be found beyond core sub-disciplinary fields – such as economic, urban, political, development, or social and cultural geography. In a relatively fragmented discipline, where teaching also mirrors key sub-field structures, this means that climate change is only partially to be found on the research and teaching agendas, and where it remains firmly located in the environment/society arena.

A second set of dynamics is intimately connected to the first, such that the positioning of climate change as a matter for the 'middle ground' of geography has served to reinforce the integrative impulse present in the global environmental change research agenda that at once seeks a form of interdisciplinarity that is concerned with overcoming 'gaps' between disciplines and which positions social science as facilitating the uptake of scientific knowledge in policy and society. Perhaps most powerfully articulated by Castree et al. (2014) this frame serves to "position researchers as metaphorical engineers whose job it is to help people cope with, or diminish, the Earth system perturbations unintentionally caused by their collective actions." As Castree (2015) further argues, to date the engagement of human geography with climate change and wider global environmental/Anthropocene concerns has been largely undertaken through this epistemology and associated assumptions: that there is one 'interconnected' world whose problems need to be diagnosed; that this knowledge can be created by bringing the integral capacities of human geography to bear; that this knowledge is necessarily problem-orientated and can be addressed to the articulated needs of policy-makers; and that the mode of knowledge production should primarily be responsive, working in the service of society's problems (Castree 2015: 7). While there is plenty of evidence of human geography that has not fallen into this 'inevitability trap', it continues to dominate the ways in which social science research agendas are articulated by research institutions and funding organisations, and has proved seductive to those seeking to advance narratives concerning the relevance of geography to society at large. For many at work in this field (Castree et al. 2014; Lövbrand et al. 2015), one consequence has been that research that takes a critical perspective tends to be eschewed in favour of that which appears to have a more practical application. Whilst agreeing with the direction of this argument – that there are important parts of human geography (and the social sciences more generally) that have yet to be seen to have value in relation to the agendas of research institutions shaping the global environmental change agenda – it is equally important to recognise that this has in part been made possible by a continued ontological separation of nature and society within our own discipline. It is also evident that as human geography's climate change research extends and diversifies, it has been precisely into these realms of critical inquiry that it has travelled, even if this remains under the radar of global research institutions and agendas.

Taken together, these dynamics point to an undercurrent within human geography which serves to stubbornly separate matters of nature from those of society and in so doing reinforces (and indeed contributes to) the particular positioning of climate change as an object around which societal responses should be formed (Hulme 2008). In short, as if climate change were a given thing, and the task of social science, in this case human geography, is to seek to analyse society's responses towards it. That, in the face of many attempts to overcome the nature-society dualism within and beyond human geography (Mansfield and Doyle 2017) this kind of precept can have survived so long is somewhat remarkable. For several decades we have been used to the idea of the social construction of environmental issues, to their political ecologies and increasingly to their new materialisms. Each of these conceptual perspectives tell us that global environmental issues do not have the status of an pre-given entity, but rather have to be made, re-made, held together, contested, is always in a state of unbecoming and so forth. As Esther Tunhout and colleagues argue "biodiversity knowledge does not simply mirror biodiversity but brings a specific version of it into being and it does so in ways that fit with a specific scientific, cultural, and political context" (Turnhout et al. 2015: 585).

Indeed, the social sciences have become central in making the argument that the ways in which we do science (and social science) matter a great deal for how particular kinds of issues come to be understood and space created for intervention. And further, that it is not only the production of knowledge that matters for how problems and their solutions come to be circumscribed, but a whole host of entities, practices and forms of agency that are assembled and configured in particular ways (Li 2007). A growing body of research across the social sciences is concerned with just this problematic: with the ways in which climate change comes to be constituted and configured. Yet to rethink the place of climate change within human geography it will not be sufficient to only recognise global environmental change as "manifestations of modernity, symptoms of dominant patterns of development, outcomes of social relations, and products of short-sighted visions, which are closely linked to beliefs, values, and world-views" and subsequently change the terms of engagement with climate change (O'Brien 2010). Rather, what is required is a greater engagement with the ways in which climate change comes into being, and what in turn it creates, entangles, undoes and removes with it. To acknowledge 'the inconsistencies and ambiguities that stalk the phrase' (Brace & Geoghegan 2010: 285), the multiplicity of meanings, forms, and relations to which it gives rise, and its radical nature, requires that we start from a different place.

3. Creating Space for Climate Change

Despite the seductions of the global environmental change research agenda and the prevalence of the ‘inevitability trap’, over the past decade human geography has sought multiple and diverse engagements with climate change, many of which have been founded with an explicit intention to question taken for granted assumptions about climate-as-object and “to articulate key social scientific problematics – surrounding, for example, the nature of power, agency, the state, market, individual responsibility and so on – with the climate change phenomenon.” (Stripple & Bulkeley 2014: 2). Others have found little reason to be optimistic about the potential for these forms of inquiry to provide a sufficient counterweight to generate alternative forms of climate change social science that come to have value beyond their own domains (Castree 2015). Yet given the increasing importance of what is sometimes loosely described as ‘critical climate studies’ within the discipline and which offers a premise for thinking differently about the socio-material constitution of climate change and its multiplicities, fragments, and ambivalent meanings, it at least provides a starting point from which to explore a different form of climate’s human geographies.

To this end, this section comprises two vignettes drawn from Bulkeley (2016) which explore the ways in which climate governance is accomplished. In doing so, the intention is to displace the notion of climate change as an object-problem around which political responses – forms of governing – are then constituted such that the task for social science is to identify these responses and overcome barriers to their implementation. By regarding climate change as a *condition*, one which comprises ‘men [sic] in their relationships, bonds and complex involvements with things’ (Foucault 2009: 96), the task comes to be one of understanding how governing and climate change are simultaneously realised. Starting from a perspective which conceives of power in facilitative and immanent terms and of governing as a programmatic and socio-material process enables an exploration of the ways in which climate change serves to foster particular spatial orderings, how these are contended and in turn how climate change is constituted through the topologies of power through which such ways of bringing the world to order are made. Central to such an approach is the understanding, derived from Foucault’s work on security and governmentality, that governing is an essentially centrifugal activity. The programmes and apparatus through which governing is pursued “have a constant tendency to expand ... new elements are constantly being integrated ... Security therefore involves organizing, or anyway allowing the development of ever-wider circuits” (Foucault 2009: 44-45). From this reading, climate’s government is unsurprisingly expansive, fostering the folding together “of disparate elements, drawn from near and far into various configurations of reach and proximity (Allen & Cochrane 2010)” (Bulkeley 2016: 19). Such dynamics are neither ubiquitous or even, but rather continually structured and contested by forms of authorisation, the ways in which socio-material orders are established and come undone, ways in which climate comes to be comprehended and the constitution of its multiple publics (Bulkeley 2016).

Whilst the vignettes offered here provide only a partial glimpse of these dynamics, each is used to illustrate the messy matter of climate's politics: its ability to get everywhere. In so doing, they open up the idea of the whereabouts of climate's politics and at the same time ask questions about how we currently conceptualise the political and its working, the dynamics that might be of concern and the ways in which we could not only think climate's politics differently but also open up questions of power and politics through climate. Beyond the purpose of illustrating the significance of moving away from an understanding of climate-as-object and the implicit nature-society dualisms that enable such a construction, the intention in these vignettes is to ask ourselves what this might mean for the position of climate change's human geographies and how they might be differently constituted and practiced. In so doing, they illuminate why taking for granted the climate problem and its solutions in scientific terms is profoundly unhelpful if we are seeking societal change – cast only as a 'renewable energy' or 'energy efficiency' challenges to which the knowledge and capacity needs to be created to act is to neglect the ways in which climate is always also entangled with other entities – communities, the nature of the state, supermarket business and so on – such that it may be these problems we need to resolve as we seek to create a progressive climate politics.

3.1 Climate Community: Berwick's Wind Turbine

Throughout the 2000s, governments and various non-state actors have sought to generate community renewable energy projects as one means through which to change the composition of electricity generation and hence atmospheric concentrations of climate change. Examining such projects in detail it becomes apparent that none of the categories deployed – community, renewable, energy, climate – are predetermined, but instead come to be formed as interventions are configured and realised. The case of the single wind turbine that came to be formed as Berwick's community energy project provides a case in point. The ambition of generating renewable electricity in Berwick, a small town on the border between Scotland and England, was first articulated in 2007 through the formation of Berwick CoRE, a social enterprise formed by the partnership of CoRE (Community Renewable Energy) and Berwick Community Development Trust. This involved multiple forms of translation and calculation, as the turbine and its situation came to be determined through measures of wind speed, finance, and the political capital that could be leveraged from diverse groups including the city council, the Berwick Freeman, national funding programmes and consultants. Once the parameters of the turbine came to be configured in this manner, it gave rise to new formulations of what it meant for Berwick to be low carbon as the project sought to enrol different parts of the community in pursuit of the resources available through the UK's *Low Carbon Community* programme. All too mindful of the emphasis of the *Challenge* on the effectiveness of 'integrated community support packages' the Berwick wind

turbine became reconfigured as part of an amalgam of low carbon interventions designed to support Low Carbon Berwick, including the installation of photovoltaics on community housing and measures to reduce energy demand and tackle fuel poverty. As community-energy circulated through Berwick, so too were new notions of what constituted the community and its purpose in relation to climate change forged, whilst all the time what climate change as community meant came to be configured.

Though initiated by the wind turbine, the resources secured for Low Carbon Berwick were not of the right kind to secure the capital investment it required. Traditional capital finance from high street banks was difficult to secure because of the variety of forms of calculation (and risk) involved from 'planning permission, a lease, a grid connection, [to] a power purchase agreement, all that sort of thing' (Berwick Interview B, 2011) before the project would be considered feasible. Alternatives were, perhaps ironically, deemed incalculable. On the one hand, it was not legally possible to give away shares in a community-owned scheme but rather they would need to be bought, potentially limiting the participation of those on low incomes and in so doing refiguring that it was that a low carbon community in the town entailed. On the other hand, the limits on the size of such investments meant that in a small community such as Berwick the possibility of leveraging the required capital was limited. In 2012, funding for the turbine was announced in the press. Verco-Baxendale, a climate change and energy consultancy, decided to invest in the turbine at a cost of approximately £1.45M with financial backing from the Co-operative Bank and Baxi Partnership. The resulting income will be split, with a 39 per cent share of the profits going to Verco and the other 61 per cent to the Trust and CoRE (which have since been amalgamated) (Berwick Advertiser 2012). In May 2014, the Trust announced that the Turbine had finally been installed:

'On the 14th January the turbine was finally completed, it was commissioned in April and officially launched by the Mayor of Berwick on the 7th May 2014. After seven years of work by the Trust and all its partners the turbine is operating and generating clean sustainable electricity and an income to support the Trust's work. ... The turbine will generate over the next 25 years an income of more than £2.3m at today's prices. The 50-metre high 500 kilowatt turbine has a blade-span of 24 metres and will generate annually the equivalent of 450 homes consumption. Extensive testing over some 15 months established that the windy site overlooking the North Sea is ideally suited as a location for 'green' energy generation with above average wind flows. Sixty one per cent of the lifetime income generated from the turbine will go to Berwick CoRE – a company now wholly owned by the Trust – with the remainder shared by the bank and other partners. The Trust will then use 80 per cent of

Berwick Core's income to support its work in Berwick and 20 per cent will be used to support a grant fund enabling community energy projects across the North East' (Berwick Trust 2014).

Even as it comes to fruition, Berwick's wind turbine is full once again of calculation, of its capacity and desirability, of the different values it embodies, and the ways in which this value can be recognised. Not only are the techniques, practices and devices of calculation multiple, but they are interwoven. In Berwick, as elsewhere, it is the interweaving of calculation, its repetition and refraction that serves as a means through which the governing of climate change is accomplished. This is not the politics of vested interests and decision points, but a slow burning, unfolding, enveloping and ongoing form of the working of power. At the same time, far from seeking to simplify and purify the assemblage, as many analysis of calculation imply, accounting for the co-benefits of the wind turbine, and indeed the wider project of being Low Carbon Berwick, requires that climate change is continually related to a multitude of other 'specific finalities' (Foucault 2009). In Berwick, making money was not an end in itself, but rather a means through which community trust could be developed and new forms of energy resilience developed.

3.2 Climate Corporation: Tesco's Low Carbon Store

Positioning themselves as one of a leading group of corporate actors in the UK responding to the Stern Review and aligned both with the non-governmental organisations orchestrating a response, including The Climate Group and WWF, as well as with the UK's international position, during the 2000s UK supermarket Tesco's sought to govern both themselves and their constituencies through the setting of targets and a host of techniques, practices and devices designed to calculate and commensurate climate change within the business and its wider sphere. Particularly intriguing was the process through which carbon came to be made commensurate with the very *design* of Tesco through the development of what were termed 'low carbon' or 'zero carbon' stores. A key target for Tesco's was that their new stores built between 2006 and 2020 would emit, on average, half as much carbon as that of a standard store designed in 2006. The building of low carbon stores provided a space within which Tesco could both demonstrate its intention to meet low carbon targets and experiment with the different means through which this could be met. In 2006, a new store at Diss, Norfolk, achieved a 50 per cent reduction in carbon emissions, and in 2007 a store with 70 per cent less emissions was opened in Cheetham Hill, Manchester, followed in 2009 by the first zero carbon store in the world at Ramsey, Cambridgeshire. Each of these stores incorporated features aimed to reduce carbon footprints, for example by building with wooden frames instead of steel, using natural light, alternative heating, cooling and ventilation systems that recycled air within stores, technical and behavioural measures

to reduce energy and water consumption, on-site energy generation and different types of refrigeration technology minimised energy use and leakage of greenhouse gas emissions (Tesco 2010). From the outset, the technology within the stores was designed to be as unobtrusive as possible. For the designers, the intention was not to draw attention to carbon – to make it stand out – but rather to make it fit within the existing Tesco store concept and experience. Yet at the same time, the low carbon features of the store are literally on display. Large glass frontage, wooden frames and low carbon technologies frame the entrance to the store, whilst inside the internal pipework of the HVAC system is laid bare, the usual chill of the fridge isles are tempered by the doors, and signs proclaim its low carbon credentials. At Tesco's low carbon stores, climate change is not only a problem to be solved, but a mean through which what it means to be a supermarket is reconsidered.

Yet not all forms of being low carbon could be made to fit and such agreement was often either temporally or spatially limited. The presence (and absence) of fridge doors is a case in point. Tesco, as is the case for most supermarkets in the UK, has traditionally used refrigeration units without doors. The low carbon stores in Cheetham Hill and Ramsey trialled new units with doors included, an adjustment that had to be accounted for not only in carbon terms but also through the management and working practices of the business:

'The company predicts how long everyone should take for a certain job. In this store, we have a higher number per cage [of products to be stacked on the shelves] because of the doors and that accounts then in our budgets for wages. We might have a slightly higher wage budget for the exact same store without doors. And they account for that' (Tesco Interview E, 2011).

Yet what could not be accounted for in such direct terms were the reactions of the employees to using such fridges. While several found that it was another routine to get used to, and were impressed with the innovation and energy savings involved, others found the change to their working practices too much to adjust to:

'Awful. If you get a box you can't open the door and you have to put it down and the doors are slamming and customers are opening them and slamming them ... The worst really is they just won't stay open' (Tesco Interview G, 2011).

Unlike other aspects of low carbon stores which have been ‘blueprinted’, ‘close-door’ fridges remain off-plan, their future uncertain as they seem to jar with the working practices of employees and what it is that Tesco’s expect their customers to expect (though have not directly interrogated). Incommensurability, climate’s purposeful absence, emerges not only in moments of high politics and open conflict, but through the manifold ways that acting on climate change fails to agree with established assemblages, whether these concern everyday mobility, the ways in which food shopping is conducted, or energy generation.

Concluding Thoughts

“If we really care deeply about the climate and other socio-environmental conditions, our theoretical gaze and political passions have to shift from a concern with the environment per se to a concern and passion for the construction of a different politics.”

Swyngedouw (2013: 2)

“To re-politicize the Anthropocene, we argue, means fostering a vibrant public space where manifold and divergent socio-ecological relations and nature concepts can be exposed and debated. In order to enable such constructive politics of the environment, environmental scholars need to demonstrate that the Anthropocene is not the end of politics.”

(Lövbrand et al. 2015: 216).

Providing glimpses of how climate change comes to be governed, the vignettes presented in this paper signal the expansive processes through which it comes to be formed and entangled in all kinds of socio-material relations, from the wind speeds above the fields in Berwick to the temperatures in a supermarket aisle. As responses to climate change emerge, so to do the entities involved come to be changed, such that what it means to be a community, a supermarket, a business, or a home are also reworked through climate change. The boundaries of what constitutes climate change are not given but are immanent to the ways in which the intention to govern are assembled, configured and realised. In turn this suggests that the governing of climate change is not a clearly circumscribed sphere for intervention, but a condition that gives rise to an unfolding set of processes and dynamics. Seen from this perspective, climate change is “not a single, complex, planet-wide socio-physical hybrid existing ‘out there’” which in turn creates a universal, “objectively knowable set of processes and effects” (Castree 2015). There is then not one finality to the climate problem, but rather

multiple, diverse, complex and often contested ways of becoming and being climate changed communities, corporations, cities and so forth, which in turn shape what it is that climate change becomes.

Rejecting the frame of climate-as-object and the concomitant sense that it is a discrete problem and instead embracing the notion of climate-as-condition opens up the whereabouts of climate's politics to new analyses. Far from being found in the corridors of power or the price of carbon, climate's politics, its ethics and sensibilities are made in relation to multiple socio-material entities and situations. This in turn opens up space for a new kind of climate politics articulated, albeit in very different ways, by Erik Swyngedouw and Eva Lövbrand and her colleagues – for creating the possibilities for shifting our gaze from the environment per se to the ways in which the condition of climate change, or more broadly the Anthropocene, comes to enable new forms of dialogue and contestation about the matter and ethics of different kinds of futures. Climate-as-condition is not only present in the moments where it comes to be framed as requiring intervention, but also in taken for granted assumptions about the nature of growth, what it means to live a good life, and the other ways in which high carbon culture is woven into socio-material fabric and where its politics are all the more necessary if less immediately visible.

Shifting the dialogue from climate-as-problem to climate-as-condition has significant implications too for the ways in which we come to know climate change and its place within the social sciences. If climate change already crosses and remakes different forms of socio-nature, the sense of a 'middle ground' where climate change might be placed in human geography (and between the natural and social sciences more generally) starts to give way. So too the logic that what is required to know climate change is an integrative form of interdisciplinary, where the task of social science is to generate the insights that can be joined with those emerging from physical sciences and needed to solve pre-determined climate problems, cannot hold. Instead, as a condition, knowing climate change requires a social science that can trace its circulations and imbrications through multiple different kinds of moments, entities and ethics, drawing together diverse kinds of knowledge – both social and scientific - through these paths. It also suggests that productive starting points for such inquiries may not only be found amongst those avowedly practicing as 'environment and society' geographers, but could equally well take root across the multiple sub-fields of the discipline (and of course across the social sciences). Making these inroads is only partly a matter of challenging the discourse of climate change as an objective problem that requires certain kinds of solution, as other critiques have ventured. While it is imperative to demonstrate the value of recognising how climate-as-condition creates new progressive possibilities for politics and action, it is also clear that there is work to do within the social sciences to dislodge the persistent view that 'the environment' is something that happens out there, and outside our domains of

responsibility. Climate change is not the first condition to pose this challenge to the academy. We can think of gender, race, social inequality and others as matters of concern that have too readily been regarded as forming discrete (parts of) disciplines and left to others to address. And just as with such other concerns, if our dialogues in human geography are going to create space for a progressive politics it is time now to make space for climate change across our discipline and to imagine new ways of being interdisciplinary through forms of translation, encounter and friction that can serve to generate new knowledges about the kinds of climate changed worlds we might inhabit.

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